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FEES FOR THIS PAPER TO DEPOSIT  
ACCOUNT NO. 23-0975

09/936324  
518 Rec'd PCT/PTO 12 SEP 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of :  
Kazutomo HIGA : Attn: BOX PCT  
Serial No. NEW : Docket No. 2001\_1202A  
Filed September 12, 2001 :

MANUFACTURING APPARATUS OF  
PRINTED WIRING BOARD, AND  
MANUFACTURING METHOD OF PRINTED  
WIRING BOARD USING THE SAME

[Corresponding to PCT/JP01/00085  
Filed January 11, 2001]

FIRST PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,  
Washington, DC 20231

Sir:

Please amend the above-identified application as follows.

In the Claims:

Kindly cancel claims 38-41 without prejudice.

Kindly amend claims 45, 67 and 68 as follows.

45. (Amended) The manufacturing apparatus of printed wiring board of claim 43,  
wherein the mechanism for oscillating the nozzle pipe is an independent mechanism in each nozzle  
pipe.

67. (Amended) The manufacturing apparatus of printed wiring board of claim 1,  
wherein the treating solution is an etchant.

ATTACHMENT E

68. (Amended) The manufacturing method of printed wiring board of claim 8, wherein the treating solution is an etchant.

**REMARKS**

The above claim amendments are presented in order to remove multiple claim dependencies, so as to reduce the required filing fee.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Respectfully submitted,

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September 12, 2001

a first treating booth having plural nozzle pipes mounting a plurality of spray nozzles and disposed at a certain angle to the running direction of the printed wiring board; and

5 a second treating booth having plural nozzle pipes disposed at a reverse angle to the above nozzle pipes;

a mechanism for oscillating the nozzle pipes in the first treating booth and the second treating booth;

plural pumps corresponding to each nozzle pipe for supplying a treating solution to the nozzle pipes; and

10 a pressure gauge connected in an individual passage between each nozzle pipe and the pump;  
wherein the output of each pump is controlled by an inverter circuit or a current or voltage control circuit.

15 45. The manufacturing apparatus of printed wiring board of claim 43 ~~or 44~~, wherein the mechanism for oscillating the nozzle pipe is an independent mechanism in each nozzle pipe.

20 46. The manufacturing apparatus of printed wiring board of claim 45, wherein the oscillating angle and oscillating speed are individually variable in the independent mechanism for oscillating the each nozzle pipe.

25 47. The manufacturing apparatus of printed wiring board of claim 46, wherein a cam, a link mechanism, and a control motor are provided in the each nozzle pipe as the independent mechanism for oscillating each nozzle pipe.

30 48. The manufacturing apparatus of printed wiring board of claim 47, wherein the oscillating angle of each nozzle pipe is variable by adjusting the cam and link mechanism.

35 49. The manufacturing apparatus of printed wiring board of claim 47, wherein the rotating speed of the control motor is controlled by an inverter circuit or a current or voltage control circuit, and the oscillating speed of the each nozzle pipe is varied.

40 50. The manufacturing apparatus of printed wiring board of claim 46, wherein a stepping motor is used as the independent mechanism for oscillating the each nozzle pipe.

45 51. The manufacturing apparatus of printed wiring board of claim 50, wherein the rotating angle or rotating speed of the stepping motor are controlled by a control and drive circuit.

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68. The manufacturing method of printed wiring board of any one of claims ~~8, 9, 17 to 19, 36, 37, 42, 59, 61, and 64 to 66~~, wherein the treating solution is an etchant.

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Kazutomo HIGA : Attn: BOX PCT  
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MANUFACTURING APPARATUS OF  
PRINTED WIRING BOARD, AND  
MANUFACTURING METHOD OF PRINTED  
WIRING BOARD USING THE SAME

[Corresponding to PCT/JP01/00085  
Filed January 11, 2001]

SECOND PRELIMINARY AMENDMENT

Assistant Commissioner for Patents,  
Washington, DC 20231

Sir:

Please amend the above-identified application as follows.

In the Claims:

Kindly cancel claims 1-37 and 42-68 without prejudice.

Kindly add new claims 69-166 as follows.

69. (New) A manufacturing apparatus of manufacturing a printed wiring board,  
comprising:

a feed roller for conveying a printed wiring board;

ATTACHMENT F

a plurality nozzle pipes disposed nearly at a uniform interval, the nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes; and  
a pump for supplying a treating solution to the nozzle pipes,  
wherein at least one of the plural nozzle pipes has a different diameter than other of the nozzle pipes.

70. (New) The manufacturing apparatus of claim 69, wherein a first nozzle pipe located at a center among the nozzle pipes has a larger diameter than other of the first nozzle pipe of the nozzle pipes.

71. (New) A manufacturing apparatus of manufacturing a printed wiring board, comprising:  
a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes disposed nearly at a uniform interval, the nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a pump for supplying a treating solution to the nozzle pipes; and  
a plurality of piping pipes disposed between the nozzle pipes and the pump, respectively;  
wherein at least one of the piping pipes has a different diameter than other of the one of the piping pipes.

72. (New) The manufacturing apparatus of claim 71,  
wherein each of the nozzle pipes has the same diameter, and  
wherein a first piping pipe disposed at a nozzle pipe located at a center among the nozzle pipes has a larger diameter than other of the first piping pipe of the piping pipes.



a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a pump for supplying a treating solution to the nozzle pipes;  
pressure regulating valves disposed in passages between the pump and the nozzle pipes, respectively; and  
pressure gauges disposed in the passages, respectively,  
said method comprising the steps of:  
adjusting the pressure regulating valves for having a first pressure gauge disposed for a nozzle pipe located at a center among the nozzle pipes indicate a higher pressure than other of the first pressure gauge of the pressure gauges, the first pressure gauge being included in the pressure gauges; and  
conveying the printed wiring board while oscillating the nozzle pipes at a constant angle and blowing the treating solution to the printed wiring board.

77. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a pump for supplying a treating solution to the nozzle pipes;  
flow rate regulating valves disposed in passages between the pump and the nozzle pipes, respectively; and  
flow meters disposed in the passages, respectively,  
said method comprising the steps of:



adjusting the flow rate regulating valves for having a first flow meter disposed for a nozzle pipe located at a center among the nozzle pipes indicate a larger flow rate than other of the first flow meter of the flow meters; and

conveying the printed wiring board while oscillating the nozzle pipes at a constant angle and blowing the treating solution to the printed wiring board.

78. (New) A manufacturing apparatus of manufacturing a printed wiring board comprising:

a feed roller for conveying a printed wiring board;

a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;

an oscillating mechanism for oscillating the nozzle pipes independently; and

a pump for supplying a treating solution to the nozzle pipes.

79. (New) The manufacturing apparatus of claim 78, wherein the oscillating mechanism has an oscillating angle and an oscillating speed which are variable.

80. (New) The manufacturing apparatus of claim 78, wherein the oscillating mechanism comprises:

cams disposed at the nozzle pipes, respectively;

link mechanisms disposed at the nozzle pipes, respectively; and

control motors disposed at the nozzle pipes, respectively.

81. (New) The manufacturing apparatus of claim 80, wherein an oscillating angle of each the nozzle pipes is varied by adjusting each of the cams and each of link mechanisms.

82. (New) The manufacturing apparatus claim 80 wherein the oscillating mechanism further comprises one of an inverter circuit, a current control circuit, and a voltage control circuit for controlling a rotating speed of the control motors.

83. (New) The manufacturing apparatus claim 78, further comprising:  
pressure regulating valves disposed in passages between the pump and the nozzle pipes, respectively; and  
pressure gauges disposed in the passages, respectively.

84. (New) The manufacturing apparatus of claim 78, further comprising:  
a first treating booth having the nozzle pipes disposed at a certain angle to a running direction of the printed wiring board; and  
a second treating booth having the nozzle pipes disposed at a reverse angle against the certain angle to the running direction.

85. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:  
a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes independently; and  
a pump for supplying a treating solution to the nozzle pipes,  
said method comprising the steps of:  
oscillating a first nozzle pipe located at a center among the nozzle pipes in a first oscillating angle at a first oscillating speed;

oscillating other of the first nozzle pipe of the nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being smaller than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed; and conveying the printed wiring board while blowing the treating solution to the printed wiring board.

86. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes independently;  
a pump for supplying a treating solution to the nozzle pipes;  
pressure regulating valves disposed in passages between the pump and the nozzle pipes, respectively; and  
pressure gauges disposed in the passages, respectively,  
said method comprising the steps of:  
oscillating a first nozzle pipe located at a center among the nozzle pipes in a first oscillating angle at a first oscillating speed;  
oscillating other of the first nozzle pipe of the nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being smaller than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed;  
adjusting the pressure regulating valves for having a first pressure gauge disposed for the first nozzle pipe indicate a higher pressure than other of the first pressure gauge of the pressure gauges; and  
conveying the printed wiring board while blowing the treating solution to the printed wiring board.

87. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;

a plurality of first nozzle pipes disposed at a certain angle to a running direction of the printed wiring board, the first nozzle pipes each having a plurality of spray nozzles mounted thereon;

a first treating booth having the first nozzle pipes;

a plurality of second nozzle pipes disposed at a reverse angle against the certain angle to the running direction, the second nozzle pipes each having a plurality of spray nozzles mounted thereon;

a second treating booth having the second nozzle pipes;

an oscillating mechanism for oscillating the first and second nozzle pipes independently; and

a pump for supplying a treating solution to the first and second nozzle pipes,

said method comprising the steps of:

oscillating a third nozzle pipe located at a center among the first nozzle pipes in a first oscillating angle at a first oscillating speed;

oscillating other of the third nozzle pipe of the first nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being smaller than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed;

oscillating a fourth nozzle pipe located at a center among the second nozzle pipes in a third oscillating angle at a third oscillating speed;

oscillating other of the fourth nozzle pipe of the second nozzle pipes in a fourth oscillating angle at a fourth oscillating speed, the third oscillating angle being smaller than the fourth oscillating angle and larger than the first oscillating angle, the third oscillating speed being larger than the fourth oscillating speed and smaller than the first oscillating speed; and

[illegible][illegible]

thereon;

respectively.

[illegible] $\Delta$ 

91. (New) The manufacturing apparatus of claim 88, further comprising:  
first support members for supporting the nozzle pipes capable of being oscillated,  
respectively, the nozzle pipes penetrating the first support members;  
second support members for supporting the first support members movably in a  
specific direction, respectively; and  
a supporting mechanism for supporting the second support members movably in a  
vertical direction to the specific direction.





an oscillating mechanism for oscillating the nozzle pipes;  
a pump for supplying a treating solution to the nozzle pipes; and  
pressure-proof flexible tubes disposed between the nozzle pipes and the pump,  
respectively,

said method comprising the steps of:

disposing first nozzle pipes disposed at a center among the nozzle pipes at a  
narrower interval than other of the first nozzle pipes of the nozzle pipes; and

conveying the printed wiring board while oscillating the nozzle pipes and blowing  
the treating solution to the printed wiring board.

105. (New) A method of manufacturing a printed wiring board using a manufacturing  
apparatus which comprises:

a feed roller for conveying a printed wiring board;

a plurality of nozzle pipes each having a plurality of spray nozzles mounted  
thereon, the nozzle pipes being individually movable vertically to a running direction of the  
printed wiring board;

an oscillating mechanism for oscillating the nozzle pipes;

a pump for supplying a treating solution to the nozzle pipes; and

pressure-proof flexible tubes disposed between the nozzle pipes and the pump,  
respectively,

said method comprising the steps of:

locating a first nozzle pipe located at a center among the nozzle pipes closer to the  
printed wiring board than other of the first nozzle pipe of the nozzle pipes; and

conveying the printed wiring board while oscillating the nozzle pipes and blowing  
the treating solution to the printed wiring board.





conveying the printed wiring board while oscillating the nozzle pipes and blowing the treating solution to the printed wiring board.

108. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

- a feed roller for conveying a printed wiring board;
  - a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;
  - an oscillating mechanism for oscillating the nozzle pipes;
  - a pump for supplying a treating solution to the nozzle pipes;
  - pressure-proof flexible tubes disposed between the nozzle pipes and the pump, respectively;
  - pressure regulating valves disposed in passages running through the nozzle pipes, pressure-proof flexible tubes, and pump, respectively; and
  - pressure gauges disposed in the passages at downstream portions of the pressure regulating valves, respectively,
- said method comprising the steps of:
- locating a first nozzle pipe located at a center among the nozzle pipes closer to the printed wiring board than other of the first nozzle pipe of the nozzle pipes;
  - adjusting the pressure regulating valves for having a first pressure gauge disposed for the first nozzle pipe indicate a higher pressure than other of the first pressure gauge of the pressure gauges; and
  - conveying the printed wiring board while oscillating the nozzle pipes and blowing the treating solution to the printed wiring board.

109. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a pump for supplying a treating solution to the nozzle pipes;  
pressure-proof flexible tubes disposed between the nozzle pipes and the pump, respectively;  
pressure regulating valves disposed in passages running through the nozzle pipes, pressure-proof flexible tubes, and pump, respectively; and  
pressure gauges disposed in the passages at downstream portions of the pressure regulating valves, respectively,  
said method comprising the steps of:  
oscillating a first nozzle pipe located at a center among the nozzle pipes in a first oscillating angle at a first oscillating speed;  
oscillating other of the first nozzle pipe of the nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being larger than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed;  
adjusting the pressure regulating valves for having a first pressure regulating gauge disposed for the first nozzle pipe indicate a higher pressure than other of the first pressure gauge of the pressure gauges; and  
conveying the printed wiring board while blowing the treating solution to the printed wiring board.

110. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;



a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a plurality of pumps for supplying a treating solution to the nozzle pipes, respectively;  
pressure gauges disposed in passages between the nozzle pipes and the pumps, respectively; and  
one of an inverter circuit, current control circuit, and voltage control circuit for controlling outputs of the pumps.

112. (New) The manufacturing apparatus of claim 111, wherein the oscillating mechanism oscillates the nozzle pipes independently.

113. (New) The manufacturing apparatus of claim 112, wherein an oscillating angle and oscillating speed of the oscillating mechanism are variable.

114. (New) The manufacturing apparatus of claim 113, wherein the oscillating mechanism comprises:

cams;  
link mechanisms; and  
control motors.

115. (New) The manufacturing apparatus of claim 114, wherein the oscillating angle of the oscillating mechanism varies by adjusting the cams and link mechanisms.

116. (New) The manufacturing apparatus of claim 114, wherein the oscillating mechanism further comprises one of an inverter circuit, current control circuit, and voltage control circuit for controlling a rotating speed of each of the control motors.

117. (New) The manufacturing apparatus of claim 113, wherein the oscillating mechanism comprises stepping motors.

118. (New) The manufacturing apparatus of claim 117, wherein the oscillating mechanism further comprises a circuit for controlling a rotating angle or rotating speed of each of the stepping motors.

119. (New) The manufacturing apparatus of claim 113, further comprising:  
means for storing treating area data of each of blocks into which the printed wiring board is divided at a dividing line in parallel with a running direction of the printed wiring board;  
means for storing correction data for each of the nozzle pipes;  
means for selecting selection data from the correction data;  
means for calculating output data for the pumps from the selection data; and  
means for controlling outputs of the pumps according to the output data.

120. (New) The manufacturing apparatus of claim 119, further comprising:  
control motors for oscillating the nozzle pipes according to the output data, respectively; and  
means for controlling a rotating speed of each the control motors.

121. (New) The manufacturing apparatus of claim 119, further comprising:  
stepping motors for oscillating the nozzle pipes according to the output data, respectively; and

means for controlling a rotating angle or rotating speed of each of the stepping motors.

122. (New) The manufacturing apparatus claim 119, wherein means for controlling outputs of the pumps comprises one of inverter circuits, current control circuits, and voltage control circuits for controlling outputs of the pumps, respectively.

123. (New) The manufacturing apparatus of claim 121, further comprising one of an inverter circuit, current control circuit, and voltage control circuit for controlling a rotating speed of each of the control motors.

124. (New) The manufacturing apparatus of claim 122, further comprising a control/drive circuit for controlling a rotating angle or a rotating speed of each of the stepping motors.

125. (New) The manufacturing apparatus claim 120, wherein the correction data is an electric signal indicating a treating condition including at least one of a spray pressure, an oscillating speed, and an oscillating angle being set for each of the nozzle pipes.

126. (New) The manufacturing apparatus of claim 125, wherein the means for storing the correction data stores a plurality of correction data corresponding to the treating area data.

127. (New) A manufacturing apparatus of manufacturing a printed wiring board, comprising:

a feed roller for conveying a printed wiring board;

a plurality of first nozzle pipes disposed at a certain angle to a running direction of the printed wiring board, the first nozzle pipes each having a plurality of spray nozzles mounted thereon;

a first treating booth having the first nozzle pipes;

a plurality of second nozzle pipes disposed at a reverse angle against the certain angle to the running direction, the second nozzle pipes each having a plurality of spray nozzles mounted thereon;

a second treating booth having the second nozzle pipes;

an oscillating mechanism for oscillating the first and second nozzle pipes;

a plurality of pumps for supplying a treating solution to the first and second nozzle pipes, respectively;

pressure gauges disposed in passages between the first and second nozzle pipes and the pumps, respectively; and

one of an inverter circuit, current control circuit, and voltage control circuit for controlling outputs of the pumps.

128. (New) The manufacturing apparatus of claim 127, wherein the oscillating mechanism oscillates the first and second nozzle pipes independently.

129. (New) The manufacturing apparatus of claim 127, wherein an oscillating angle and oscillating speed of the oscillating mechanism are variable.

130. The manufacturing apparatus of claim 129, wherein the oscillating mechanism comprises:

cams;

link mechanisms; and

control motors.



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17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	4
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[illegible]

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adjusting outputs of the pumps for having a first pressure gauge disposed for a nozzle pipe located at a center among the nozzle pipes indicate a higher pressure than other of the first pressure gauge of the pressure gauges, the first pressure gauge being included in the pressure gauges; and

136. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;

a plurality of first nozzle pipes disposed at a certain angle to a running direction of the printed wiring board, the first nozzle pipes each having a plurality of spray nozzles mounted thereon;

a first treating booth having the first nozzle pipes;

a plurality of second nozzle pipes disposed at a reverse angle against the certain angle to the running direction, the second nozzle pipes each having a plurality of spray nozzles mounted thereon;

a second treating booth having the second nozzle pipes;

an oscillating mechanism for oscillating the first and second nozzle pipes;

a plurality of pumps for supplying a treating solution to the first and second nozzle pipes, respectively;

first pressure gauges disposed in passages between the first nozzle pipes and the pumps, respectively;

second pressure gauges disposed in passages between the second nozzle pipes and the pumps, respectively; and

one of an inverter circuit, current control circuit, and voltage control circuit for controlling outputs of the pumps,

said method comprising the steps of:

adjusting outputs of the pumps for having a third pressure gauge disposed for a nozzle pipe located at a center among the first nozzle pipes indicate a higher pressure than other of the third pressure gauge of the first pressure gauges, the third pressure gauge being included in the first pressure gauges;

adjusting outputs of the pumps for having a fourth pressure gauge disposed for a nozzle pipe located at a center among the second nozzle pipes indicate a higher pressure than other of the fourth pressure gauge of the second pressure gauges, and for having the fourth pressure gauge indicate a lower pressure than the third pressure gauge, the fourth pressure gauge being included in the second pressure gauges; and

conveying the printed wiring board while oscillating the first and second nozzle pipes and blowing the treating solution to the printed wiring board.

137. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;

a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;

an oscillating mechanism for oscillating the nozzle pipes;

a plurality of pumps for supplying a treating solution to the nozzle pipes, respectively;

pressure gauges disposed in passages between the nozzle pipes and the pumps, respectively; and

one of an inverter circuit, current control circuit, and voltage control circuit for controlling outputs of the pumps,

said method comprising the steps of:

oscillating a first nozzle pipe located at a center among the nozzle pipes in a first oscillating angle at a first oscillating speed;

oscillating other of the first nozzle pipe of the nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being smaller than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed; and

conveying the printed wiring board while blowing the treating solution to the printed wiring board.

138. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;

a plurality of first nozzle pipes disposed at a certain angle to a running direction of the printed wiring board, the first nozzle pipes each having a plurality of spray nozzles mounted thereon;

a first treating booth having the first nozzle pipes;

a plurality of second nozzle pipes disposed at a reverse angle against the certain angle to the running direction, the second nozzle pipes each having a plurality of spray nozzles mounted thereon;

a second treating booth having the second nozzle pipes;

an oscillating mechanism for oscillating the first and second nozzle pipes;

a plurality of pumps for supplying a treating solution to the first and second nozzle pipes, respectively;

first pressure gauges disposed in passages between the first nozzle pipes and the pumps, respectively;

second pressure gauges disposed in passages between the second nozzle pipes and the pumps, respectively; and

[illegible][illegible]

oscillating other of the third nozzle pipe of the first nozzle pipes in a second oscillating angle at a second oscillating speed, the first oscillating angle being smaller than the second oscillating angle, the first oscillating speed being larger than the second oscillating speed;

oscillating other of the fourth nozzle pipe of the second nozzle pipes in a fourth oscillating angle, the third oscillating angle being smaller than the fourth oscillating angle and larger than the first oscillating angle, the third oscillating speed being larger than the first oscillating speed; and

139. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;

a plurality of pumps for supplying a treating solution to the nozzle pipes, respectively;

- 25 -

means for storing treating area data of each of blocks into which the printed wiring board is divided at a dividing line in parallel with a running direction of the printed wiring board;

means for storing correction data for each of the nozzle pipes;

means for selecting selection data from the correction data;

means for calculating output data for the pumps from the selection data; and

means for controlling an output of each of the pumps according to the output data,

said method comprising the steps of:

calculating the treating area data of each of the blocks from CAD data for drawing a wiring pattern on the printed wiring board;

inputting the treating area data into the means for storing treating area data; and

conveying the printed wiring board while oscillating the nozzle pipes and blowing the treating solution to the printed wiring board.

140. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;

a plurality of nozzle pipes each having a plurality of spray nozzles mounted thereon;

an oscillating mechanism for oscillating the nozzle pipes;

a plurality of pumps for supplying a treating solution to the nozzle pipes, respectively;

a plurality of pressure gauges disposed in passages between the nozzle pipes and the pumps, respectively;

means for storing treating area data of each of blocks into which the printed wiring board is divided at a dividing line in parallel with a running direction of the printed wiring board;

means for storing correction data for each of the nozzle pipes;

means for selecting selection data from the correction data;

means for calculating output data for the pumps from the selection data;  
means for controlling an output of each of the pumps according to the output data;  
control motors for oscillating the nozzle pipes according to the output data,  
respectively; and  
means for controlling a rotating speed of each of the control motors,  
said method comprising the steps of:  
calculating treating area data of each of the blocks from CAD data for drawing a  
wiring pattern on the printed wiring board;  
inputting the treating area data to the means for storing treating area data; and  
conveying the printed wiring board while oscillating the nozzle pipes and blowing  
the treating solution to the printed wiring board.

141. (New) A method of manufacturing a printed wiring board using a manufacturing apparatus which includes:

a feed roller for conveying a printed wiring board;  
a plurality of nozzle pipes each having a plurality of spray nozzles mounted  
thereon;  
an oscillating mechanism for oscillating the nozzle pipes;  
a plurality of pumps for supplying a treating solution to the nozzle pipes,  
respectively;  
a plurality of pressure gauges disposed in passages between the nozzle pipes and  
the pumps, respectively;  
means for storing treating area data of each of blocks into which the printed wiring  
board is divided at a dividing line in parallel with a running direction of the printed wiring board;  
means for storing correction data for each of the nozzle pipes;  
means for selecting selection data from the correction data;  
means for calculating output data for the pumps from the selection data;

means for controlling an output of each of the pumps according to the output data;  
stepping motors for oscillating the nozzle pipes according to the output data,  
respectively; and

means for controlling a rotating angle or a rotating speed of the stepping motors,  
said method comprising the steps of:

calculating treating area data of each blocks from CAD data for drawing a wiring  
pattern on the printed wiring board;  
inputting the treating area data to the means for storing treating area data; and  
conveying the printed wiring board while oscillating the nozzle pipes and blowing  
the treating solution to the printed wiring board.

142. (New) The manufacturing apparatus of claim 69, wherein the treating solution is  
an etchant.

143. (New) The method of claim 76, wherein the treating solution is an etchant.

144. (New) The manufacturing apparatus of claim 71, wherein the treating solution is  
an etchant.

145. (New) The manufacturing apparatus of claim 73, wherein the treating solution is  
an etchant.

146. (New) The manufacturing apparatus of claim 78, wherein the treating solution is  
an etchant.

147. (New) The manufacturing apparatus of claim 88, wherein the treating solution is  
an etchant.



148. (New) The manufacturing apparatus of claim 111, wherein the treating solution is an etchant.

149. (New) The manufacturing apparatus of claim 127, wherein the treating solution is an etchant.

150. (New) The method of claim 77, wherein the treating solution is an etchant.

151. (New) The method of claim 85, wherein the treating solution is an etchant.

152. (New) The method of claim 86, wherein the treating solution is an etchant.

153. (New) The method of claim 87, wherein the treating solution is an etchant.

154. (New) The method of claim 104, wherein the treating solution is an etchant.

155. (New) The method of claim 105, wherein the treating solution is an etchant.

156. (New) The method of claim 107, wherein the treating solution is an etchant.

157. (New) The method of claim 108, wherein the treating solution is an etchant.

158. (New) The method of claim 109, wherein the treating solution is an etchant.

159. (New) The method of claim 110, wherein the treating solution is an etchant.

160. (New) The method of claim 135, wherein the treating solution is an etchant.

161. (New) The method of claim 136, wherein the treating solution is an etchant.
162. (New) The method of claim 137, wherein the treating solution is an etchant.
163. (New) The method of claim 138, wherein the treating solution is an etchant.
164. (New) The method of claim 139, wherein the treating solution is an etchant.
165. (New) The method of claim 140, wherein the treating solution is an etchant.
166. (New) The method of claim 141, wherein the treating solution is an etchant.

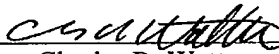
**REMARKS**

Kindly enter the above claim amendments prior to initial examination. These amendments are effective to cancel all previous claims and add new claims 69-166.

Also, Proposed Drawing Amendments are presented herewith under separate cover letter in order to make corrections to Fig. 2.

Respectfully submitted,

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September 12, 2001

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ACCOUNT NO. 03-0915

518 Rec'd PCT/PTO 12 SEP 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of :  
Kazutomo HIGA : Attn: BOX PCT  
Serial No. NEW : Docket No. 2001\_1202A  
Filed September 12, 2001 :

MANUFACTURING APPARATUS OF  
PRINTED WIRING BOARD, AND  
MANUFACTURING METHOD OF PRINTED  
WIRING BOARD USING THE SAME

[Corresponding to PCT/JP01/00085  
Filed January 11, 2001]

LETTER RE PROPOSED DRAWING AMENDMENTS

Assistant Commissioner for Patents,  
Washington, D.C.

Sir:

Enclosed herewith is a photocopy of Fig. 2 marked in red to indicate proposed drawing amendments thereto.

The Examiner is requested to approve such proposed drawing amendments

Respectfully submitted,

Kazutomo HIGA

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September 12, 2001

Fig. 2

